Spectrophotometry and the Development of Emissions for Comet Hyakutake 1996 B2

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An analysis of our spectrophotometry of Comet Hyakutake 1996 B2 from 0.55μm to 1.05μm obtained between February 17 and April 17 1996 is presented. We derive A$f\rho$ values and production rates of H_2O, C_2, NH_2, and CN. In general we find the Haser model to be substantiated with no inconsistencies for different aperture sizes and different heliocentric and geocentric distances. Comet Hyakutake is the dustiest comet in our database of 39 comets (Fink and Hicks 1996) and both the dust and the H_2O production rates follow a heliocentric dependence of $\sim r^{-1.5}$, lower than the $\sim r^{-2.5}$ dependence found for P/Halley (Fink 1994). The A$f\rho$ values and the H_2O production rates track the visual lightcurve quite well. Strong evidence for quenching of OI emissions close to the nucleus was observed during the March data due to the comet's small geocentric distance. While the CN production rate also has a dependence of $\sim r^{-1.5}$ with a CN/H_2O ratio typical of most comets, the C_2 production rate has a much steeper slope, $\sim r^{-2.5}$, and the C_2/H_2O ratio evolves from a typical cometary ratio to one that is exceedingly rich in C_2. We feel that this is evidence for a significant CHON contribution to the overall C_2 production. The NH_2 production is considerably flatter and follows roughly a $\sim r^{-0.85}$ law. In February and March, Hyakutake exhibits the highest relative NH_2 abundance of any comet in our database, but reverts to more a normal value in April. All together, we feel that the behavior of the comet's A$f\rho$ and production rates throughout its apparition argue for a more primordial comet than may be suggested by the orbital elements alone.

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